

~~SECRET~~

FINAL REPORT

November 1952

CHAPTER SEVEN

A PROPOSED CHANGE FOR IMPROVED PERFORMANCE
OF JET AIRCRAFT

CHAPTER SEVEN

A PROPOSED METHOD FOR EVALUATING PERFORMANCE OF JET AIRCRAFT

I. Introduction

This short note refers to an idea which may have important applications to technical intelligence problems in which the analysis of the spectra of light sources is an essential feature. It is included in this report because the idea grew out of the writer's association with ATIC in the discussion and development of the grating-camera system for observing anomalous luminous phenomena. The writer's point of view in this discussion has been to point out that the observation of atmospheric phenomena is an essential part of the defense of this Nation from surprise attacks, so that even if one may feel that certain observations will yield no unpredictable results, the by-products which come out of such observations will justify the time spent. The present chapter tries to illustrate this.

II. The Proposal

1. The writer is not an expert in the problems of combustion, aerodynamics and jet fuels, but the study of air glow spectra suggests that one might determine the character and possibly even the efficiency of combustion processes in actual aircraft in flight, by obtaining spectra of the luminous exhausts with high light gathering power spectrographs. It is realized that the implementation of such an idea, even if it turns out to be a promising one, is not going to be very easy. The relationship of this idea to the grating-camera system is reasonably clear, but actually it was suggested as such by the writer's experience with the problems of the night air glow and with the study of weak radiation sources

in the laboratory.

2. With improved knowledge of combustion spectroscopy, it should be possible to identify certain variations as giving us valuable information regarding the performance of vehicles which depend on combustion, and which produce a luminous exhaust. The spectroscopy of such sources can be studied and tested in the laboratory, and the equipment which is designed for actual flight observations can also be tested under favorable and accessible conditions. The feasibility of a detection device based on the spectroscopy of luminous exhausts could probably be determined fairly readily by consultation with those who have had experience in such areas.

III. Recommendations

1. The general method, that promising techniques for obtaining valuable intelligence should be tested whenever the by-products justify such tests, is the one followed here. In a completely different area, it is becoming clear that the spectroscopy of the night airglow may become a significant part of the future observational program in meteorology, because it will give us information about solar radiation that is trapped in the high atmosphere. Thus spectrographs, or even simpler modifications of such equipment such as grating-camera or filter-camera combinations, will have to be developed for these studies. It may well turn out that the need to monitor the developments of jet aircraft performance, may have as a very valuable by-product the development of spectrographs which are useful in meteorology and in other areas of atmospheric physics.

2. It is recommended that a study be made of the possible value of spectrographs or variations as suggested above, in the monitoring of

the performance of jet aircraft. This is a task which might be made part of the already existing program in the combustion field.